

I. Project Title: **INTERAGENCY STANDARDIZED MONITORING PROGRAM (ISMP) ASSESSMENT OF COLORADO PIKEMINNOW REPRODUCTION AND LARVAL ABUNDANCE IN THE LOWER YAMPA RIVER, COLORADO**

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III. Project Summary: Larval Colorado pikeminnow *Ptychocheilus lucius* (formerly, Colorado squawfish) were sampled with drift nets at two sites in 1999. Sites included the lower Yampa River, Echo Park, Colorado, the Green River in Echo Park, just upstream of the Yampa River. Sampling was designed to provide a measure of annual reproductive success of Colorado pikeminnow. Diel variation in abundance of Colorado pikeminnow larvae in the drift was also assessed. This data will be used to assess effects of flow and temperature regimes on reproduction by Colorado pikeminnow and to correlate abundance of larvae to abundance of juveniles in autumn.

IV. Study Schedule: It is anticipated that this study will continue under the auspices of the *Interagency Standardized Monitoring Program (ISMP)* and will be a component of studies designed to evaluate operations of Flaming Gorge Reservoir.

V. Relationship to RIPRAP: Reproduction and recruitment of early life stages are critical components of the life history of endangered Colorado pikeminnow. Understanding trends in reproductive success may help define status of Colorado pikeminnow in specific river reaches in the Colorado River Basin and should play a role in determining when recovery has been achieved.

Annual assessment of Colorado pikeminnow reproduction and larval abundance (this study) is also necessary to assess factors affecting annual recruitment, and is directly linked with many Recovery Program activities such as discharge

management and control of non-native fishes. Specifically, data collected in this study will be used to evaluate effects of implementation of flow and temperature recommendations for Flaming Gorge Reservoir operation (Muth et al. 2000).

Specific RIPRAP Relationships **Green River Mainstem**—*I.A.1.a.* (Provide and protect instream flows--habitat management; Green River above Duchesne River; initially identify year-round flows needed for recovery while providing experimental flows; summer/fall), *I.A.1.c.* (Provide and protect instream flows--habitat management; Green River above Duchesne River; initially identify year-round flows needed for recovery while providing experimental flows; summer/fall; review summer/fall flow recommendations), *I.A.3.a.* (Provide and protect instream flows--habitat management; Green River above Duchesne River; deliver identified flows; operate Flaming Gorge pursuant to the Biological Opinion to provide summer and fall flows), *I.A.3.c.* (Provide and protect instream flows--habitat management; Green River above Duchesne River; deliver identified flows; operate Flaming Gorge Dam to provide winter and spring flows and revised summer/fall flows, if necessary), *I.B.1.* (Provide and protect instream flows--habitat management; Green River below the Duchesne River; initially identify year-round flows needed for recovery while providing experimental flows), *I.B.2.a* (Provide and protect instream flows--habitat management; Green River below the Duchesne River; initially identify year-round flows needed for recovery while providing experimental flows; review scientific basis), *II.A.1.a.4.* (Restore habitat--habitat development and maintenance; Old Charlie Wash; monitor and evaluate success), *II.C.1.* (Restore habitat--habitat development and maintenance; enhance water temperatures to benefit endangered fishes; identify options to release warmer water from Flaming Gorge Reservoir to restore native fish habitat in the Green River), *V.A.1.* (Monitor populations and habitat and conduct research to support recovery actions--research, monitoring, and data management; verify additional Colorado pikeminnow spawning areas in lower Green).

Green River, Yampa/Little Snake Rivers—*I.B.1.* (Provide and protect instream flows--habitat management; Yampa River below Little Snake River; initially identify year-round flows needed for recovery), *I.B.2.a.* (Provide and protect instream flows--habitat management; Yampa River below Little Snake River; state acceptance of initial flow recommendations; review scientific basis).

VI. Accomplishment of FY 2000 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task I). Choose the Yampa River sample site and collect samples. This task was completed. Additional samples were collected in the Green River for a portion of the summer.

II). Analyze samples and prepare annual summary report.

Lower Yampa River. Samples were collected in the Yampa River about 0.8 km upstream from the Green River, the same site that samples were collected from 1990 to 1996 (Bestgen et al. 1998) and in 1998 and 1999. A total of 213 samples were collected between 24 June and 25 August 2000. These included samples collected at dawn, noon, dusk, and midnight on six days to detect diel variation in drift abundance.

Preliminary identification of samples has been completed, but identification of questionable or difficult specimens has not yet been completed. We expect final verification to be completed in early January. Based on specimens in samples that were positively identified, a total of 1,513 Colorado pikeminnow larvae were collected between 6 July and 25 August (Fig. 1). Colorado pikeminnow captured in late August were relatively large (26 mm total length) and old. Reproduction by Colorado pikeminnow in the Yampa River, as evidenced by capture of relatively small larvae, had ceased by early August. Most Colorado pikeminnow larvae were collected from 9 July to 30 July. Large drift pulses were detected on 13-16 July, 21-22 July, and 25-27 July. Reproductive success of Colorado pikeminnow was considered high in 2000, and substantially more pikeminnow larvae were captured than in 1999 and 1998, when 685 and 716 pikeminnow larvae were collected, respectively. The 1999 and 1998 totals were substantially higher than previous years from 1991 to 1997.

Of the total of 1,513 Colorado pikeminnow larvae captured during 2000, 648 (42.8%) of those were captured in dusk and midnight samples on only six sampling dates. Drift patterns noted from 1992 to 1996 suggested occasional peaks at midnite but peaks were also noted at noon. Water clarity was exceptionally high during most of the 2000 sampling season. Clear water may have limited downstream drift of larvae because fish could maintain positions in clear water. Drift rates may have increased during the night when darkness caused larvae to lose positions. This same diel pattern was noted in 1994, a year when Yampa River discharge was low and very clear for most of the year. However, drift rates in that year were exceptionally low.

We also captured a single razorback sucker larvae on 2 July. It was 10 mm TL and its identity was assured (pers. comm. D. E. Snyder). Presence of a small and presumably young razorback sucker in the Yampa River suggests abnormally late reproduction by this species (Muth et al. 2000), especially in a water year during which discharge was not exceptionally high or cold late into the season.

We also sampled the Green River in 2000 to assess if Colorado pikeminnow had reproduced. Reproduction might be expected there because newly implemented flow and temperature recommendations were to create conditions in the Green River more like the free-flowing Yampa River where Colorado pikeminnow reproduce. A total

of 59 samples were collected there from 27 July to 10 August. No razorback suckers or Colorado pikeminnow were captured in those samples. Sampling may have been initiated too late to have a high probability of detecting reproduction by Colorado pikeminnow in the Green River, if such had occurred. The Program should evaluate whether a more concerted effort is needed in the next few years to determine if Colorado pikeminnow are reproducing in the Green River upstream of the Yampa River.

We also collected water temperature data to determine if the Green River was no less than about 5°C cooler than the Yampa River as specified in the Flaming Gorge Flow and Temperature Recommendations (Muth et al. 2000). Dawn water temperatures of the Green River were generally above about 18°C for most of the summer, and were generally within about 5°C of the Yampa River. This was particularly true in July. The few diel water temperatures collected indicated that the Green River did not warm as much during the day as the Yampa River. More extensive water temperature collection and analysis should be conducted in the following years to assess the differences in water temperatures in the two systems.

- VII. Recommendations: Continue to sample early life stages of Colorado pikeminnow annually at these sites. This information is critical to establishment of long-term data that can guide informed management decisions regarding population viability and recovery. This information can also be used to make real-time recommendations for flow and temperature regimes for Flaming Gorge Dam during the critical time of reproduction for endangered Colorado pikeminnow. The Recovery Program should increase funding for this project to cover costs for additional sample processing costs incurred for the Green River samples. Sampling may also need to be expanded to assess reproduction by razorback suckers in the Yampa River. Verification of yet unidentified sucker specimens may shed additional light on the prevalence of razorback sucker larvae in the Yampa River.
- VIII. Project Status: On track and ongoing. This project was approved for funding in 2001, in combination with spring sampling for early life stages of razorback suckers. That information, combined with more sophisticated water temperature data acquisition, should provide some tools for making flow and temperature recommendations to guide operation of Flaming Gorge Reservoir.
- IX. FY 2000 Budget Status
 - A. Funds Provided: \$30,000
 - B. Funds Expended: 26,5000
 - C. Difference: \$3,500, to be used for sample verification.

- D. Percent of the FY 2000 work completed, and projected costs to complete: Funds remaining should be sufficient to finish Yampa River samples. Green River samples may need to await additional funding which could be provided in 2001.
- E. Recovery Program funds spent for publication charges: NA
- X. Status of Data Submission (Where applicable): Data will be submitted when specimen identity is completed.

XI. Signed: Karin R. Bogen 5 December 2000

Principal Investigator Date

(Just put name and date here, since you will be submitting the report electronically)

APPENDIX: *[More comprehensive/final project reports (NOT to be used in place of a complete annual report.). If distributed previously, simply reference the document or report.]*

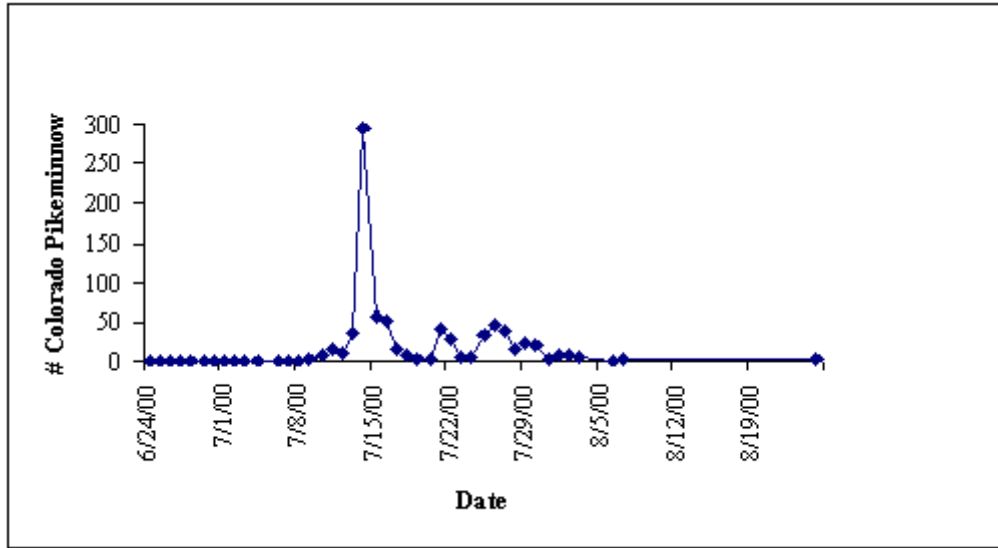


Fig. 1. Number of Colorado pikeminnow larvae captured in the Yampa River, summer 2000.

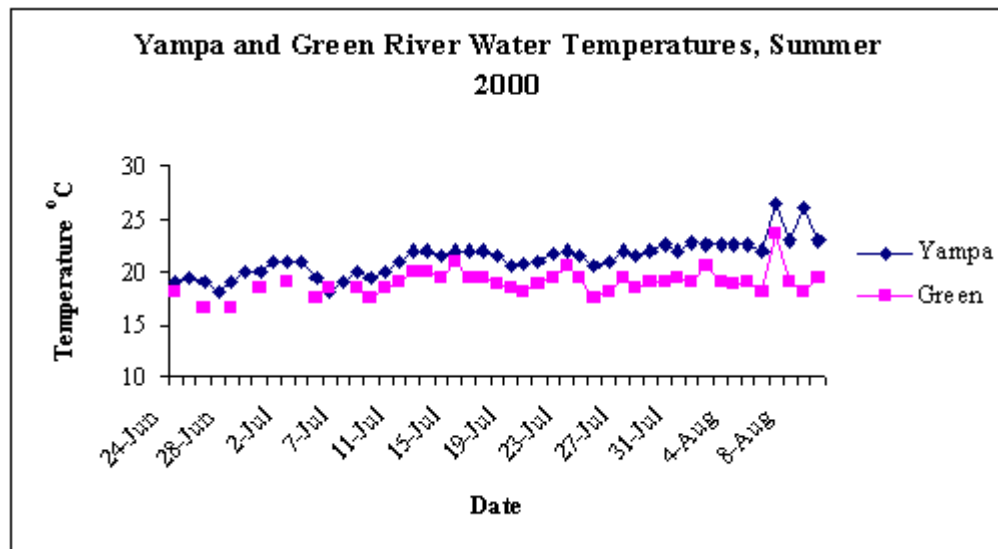


Fig. 2. Water temperatures of the Yampa and Green rivers in summer 2000.